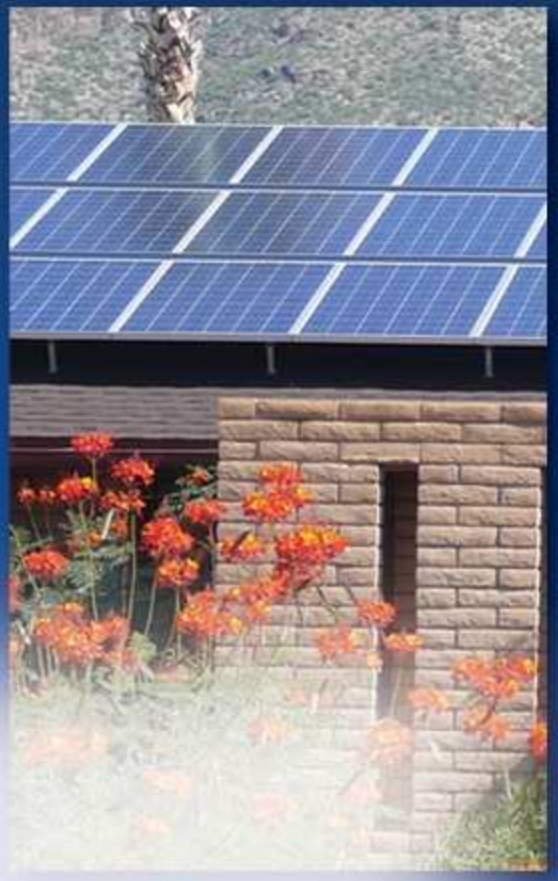

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Solar Power 101 – PV (Photovoltaic) Basics

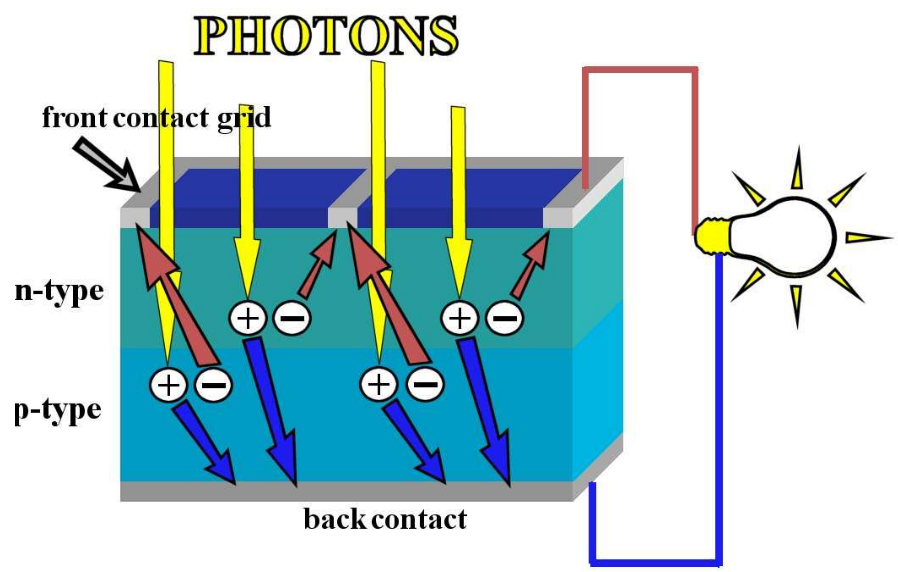
- Definitions
- Before Going Solar (Conservation)
- How Grid-Tied PV Systems Work
- PV Installations Types
- Steps to Going Solar
- Q and A

Definitions

Converting Sunlight to Electricity

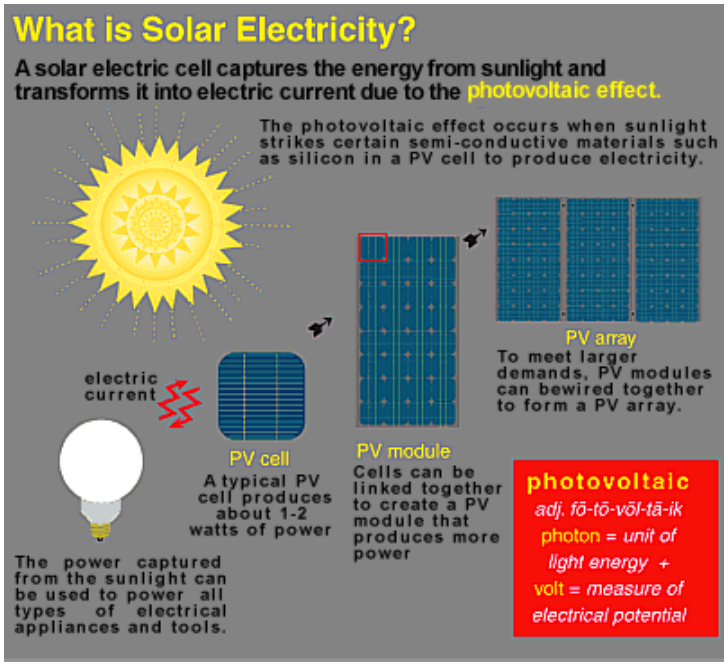
pho·to·vol·ta·ic(f½”t½-v¼l-t^{3}“^{1}k, -v½l-) *adj*. Capable of producing a voltage when exposed to radiant energy, especially light.

Sunlight (photons) push electrons around in something called a PN junction which is the building block of the computer industry. Once the electrons get pushed out of their resting place (holes) their only way to reunite as an electron-hole pair is to ride back through a light, motor, etc. and do useful work for us.

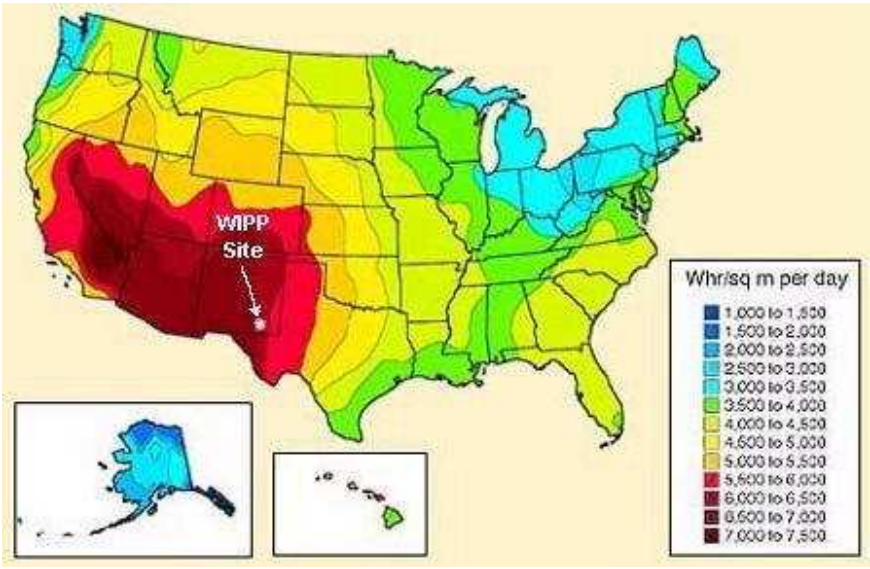


Definitions

Photovoltaics



Insolation

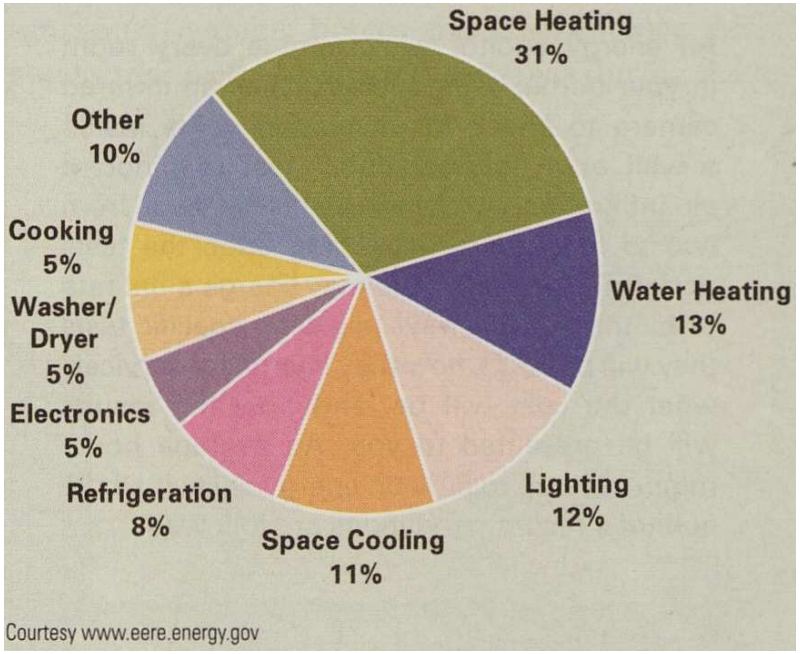


Before Going Solar (Conservation)

U.S. Energy Consumption

North America has 7 percent of the world's population, and consumes 30 percent of the world's energy.

- Energy Ottawa



Before Going Solar (Conservation)

What is the Grid?

The North American Grid at Night.

The Grid is a power delivery network.

By comparison, the Internet is an information delivery network.

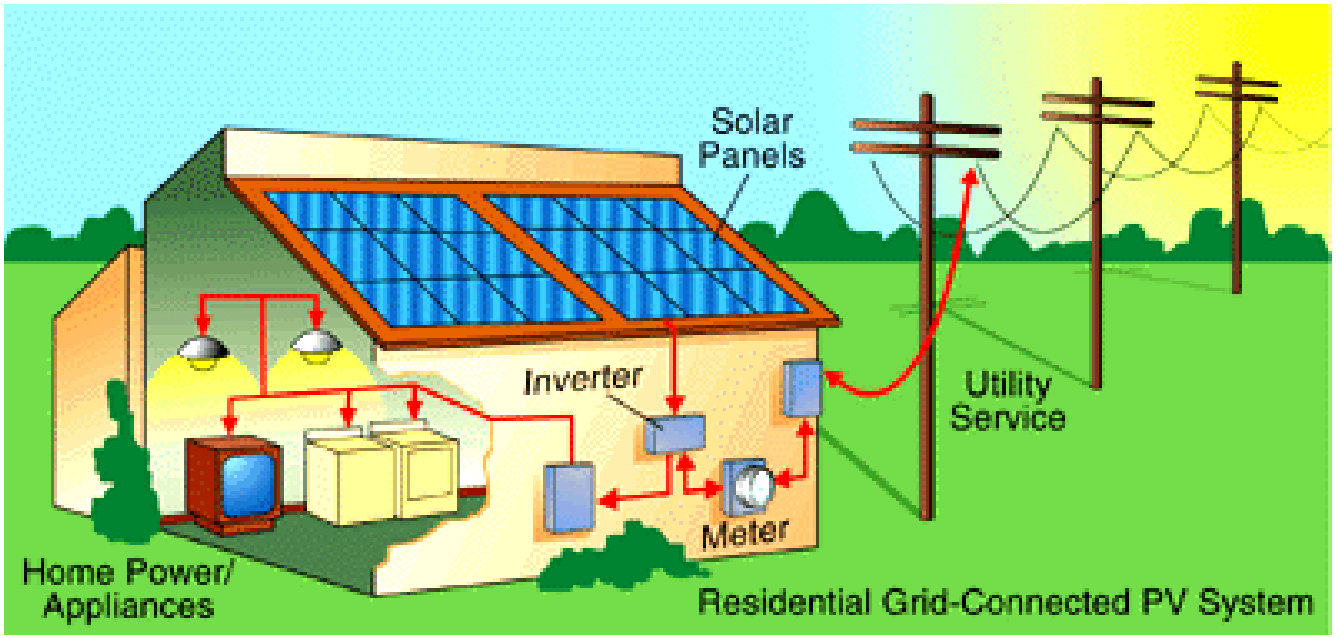
Before Going Solar

Conservation

- Eliminate clothes dryer use
- Use compact fluorescent or LED bulbs
- Replace pre-1993 refrigerators, don't use in garage
- Buy front loading washing machine (when replacing)
- Use a hot water heater blanket
- Use power strips to control phantom loads
- Schedule car free days
- Add attic insulation
- Recycle
- Use a Kill-A-Watt meter to measure appliance loads. Available for under $30.
- When replacing, buy at least SEER 15 AC/heat pump unit

How Grid-Tied PV Systems Work

- PV panels produce DC electricity which is then converted to AC house current using a Grid-Tied Inverter
- If the house can't use all the electricity the PV system produces, then the excess is put back on the grid for others to use.



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PV Installations

Steps to Going Solar

Questions One Might Ask a Potential Integrator (Installer)

- Are you on the TEP or Trico approved installer list?
- Are you a licensed electrician?
- Are you and/or any staff NABCEP certified?
- Where are modules, inverters, and racking system manufactured?
- Will you make clear all assumptions associated with financial return estimates?
- How is 1099 income accounted for in your quote?

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Steps to Going Solar

Contact an installer to perform an on-site evaluation

- Determine historical energy use from electric bills
- Determine roof area available for photovoltaic panels
- Select location for photovoltaic panels, solar inverter, and production meter
- Discuss costs for various system sizes
- Discuss installation timing

Decide to Go Ahead with Photovoltaic Installation

- Submit application to electric utility
- Sign contract with electric utility
- Sign contract with licensed contractor

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Steps to Going Solar

Contractor Installs System

- Generate design drawings and pull permit
- Install system on scheduled week
- County or City inspects system once installation is complete
- Utility sends rebate check 6 to 8 weeks after they inspect system

Enjoy decades of environmentally friendly and maintenance free electricity

Example PV System Pricing

Residential 5280WDC Grid-Tie System Roof Mount (TEP) - Quote

Valid through March 24, 2011

TOTAL PROJECT COST INCLUDING MATERIALS AND INSTALLATION		$27,724
22 SILIKEN SLK60240 PV Portrait Mount Modules with 25 year warranty		
One SMA SB5000US Grid-Tied Inverter with 10 year warranty		
Total System 10 year warranty		
TEP Residential INCENTIVE	$2.00 /DC Watt	-$10,560
TOTAL CASH OUTLAY		$17,164
Residential STATE TAX CREDIT (2011)		-$1,000
Residential FEDERAL TAX CREDIT (2011)		-$8,318
1099 MISCELLANEOUS INCOME IN 28% TAX BRACKET		$2,957
NET PROJECT COST		**$10,803**

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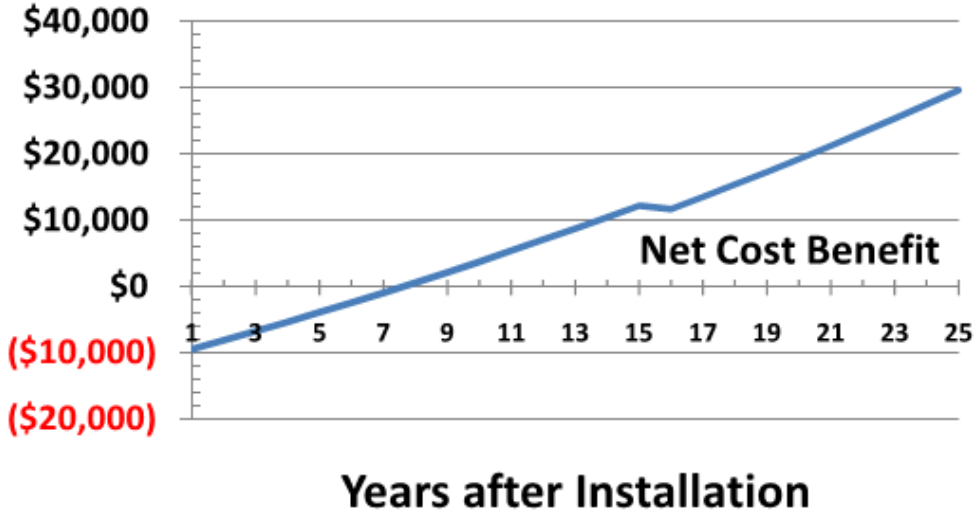
Example PV System Performance Estimate

SYSTEM PEAK OUTPUT	5280 WDC			$86.15 Monthly	
ANNUAL/MONTHLY/DAILY	9753 KWh	813 KWh		27 KWh	
PAYBACK PERIOD	7.6 years	$5.25 DC Watt		ANNUAL	12000
ANNUAL RATE OF RETURN	**4.8 %**	**$2.05** DC Watt		% PV	81%



Shaded Area	443	sq. ft.
Total Weight	1032	lbs
Avoided CO2	12678	lbs/year
Days on Site	3	days
Jurisdiction	City of Tucson	
Inverter Replacement		$2,357
PV Degradation per Year		0.9%
Utility Rate ($/KWh)		$0.106
Tax Rate		28.0%
Annual Utility Increase		3.0%

Q and A